



UNITED STATES PATENT AND TRADEMARK OFFICE

PL
UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,501	06/05/2001	Wei Gao	22435-004	5900

30623 7590 08/20/2003

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY
AND POPEO, P.C.
ONE FINANCIAL CENTER
BOSTON, MA 02111

EXAMINER

MENEFEE, JAMES A

ART UNIT	PAPER NUMBER
----------	--------------

2828

DATE MAILED: 08/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/874,501

Applicant(s)

GAO, WEI

Examiner

James A. Menefee

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-30 and 32-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-30 and 32-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Response to Amendment

In response to the amendment filed 13 June 2003, claims 4 and 31 are cancelled, and claims 1, 5, 7-14, 16, and 32-36 are amended. Claims 1-3, 5-30, and 32-36 are pending.

Drawings

The drawings filed on 5 June 2001 are acceptable subject to correction of the informalities indicated on the attached "Notice of Draftsperson's Patent Drawing Review," PTO-948. In order to avoid abandonment of this application, correction is required in reply to the Office action. The correction will not be held in abeyance.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

1. Correction of Informalities -- 37 CFR 1.85

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Art Unit: 2828

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.185(a). Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 10-12, 14-22, 26-30, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuribayashi et al. (previously cited US 6,023,481) in view of Roberts et al. (US 6,335,548).

Regarding claims 1, 32-33 and 35, Kuribayashi discloses in Fig. 5 a laser diode assembly comprising a carrier 32 having a top and bottom, the top having a thermally conductive layer 20,22 sized for attaching at least two bonding members thereto, a laser diode 18 having a top and bottom, the bottom being electrically coupled to the carrier 32 and the top inherently having at least one thermally conductive pad formed thereon and sized for attaching at least one bonding member thereto, and first and second bonding members 24,28 thermally coupling the conductive pads to the conductive layer 20,22. While there is not an explicit disclosure of at least one conductive pad on the laser, it is inherent that this is the case because such pads are necessary for attaching bonding wires 24,28. It is not explicitly disclosed that the layer 20,22 or the pads are thermally conductive, or that the bonding members thermally couple the layers to the pad.

Art Unit: 2828

However, such elements are typically made of a metal material, and thus will necessarily be thermally conductive. It is not disclosed that there are two conductive pads on top of the laser diode. However, Roberts teaches that it is advantageous to include more than one bonding pad in a place where there are bonding pads (par. bridging col. 16-17). It would have been obvious to one skilled in the art to include these extra bonding pads in order to decrease the chance of catastrophic failure, as taught by Roberts.

Regarding claim 2, the carrier 32 is insulating.

Regarding claim 3, the specific materials of the carrier are not disclosed. However, it is disclosed that the carrier is insulating, and among these materials are known insulators. It would have been obvious to one skilled in the art to make the carrier of these materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 5, if there are a number of conductive pads, as deemed obvious above, then some will necessarily be formed on opposing sides of a top side of the laser diode 18.

Regarding claim 10, a laser diode will typically have top and bottom electrodes. It would have been obvious to make the laser diode in this manner so that it may be electrically pumped. As one of the electrodes will be on top, at least one of the conductive pads will be coupled to the top electrode.

Regarding claim 11, it is not explicitly disclosed that heat will be dissipated from the laser through the conductive pads. Since the bonding wires are made of conductive material, then heat will necessarily dissipate out from the laser through the wires.

Art Unit: 2828

Regarding claim 12, the bonding members 24, 28 are wires.

Regarding claims 14-15, the conductive layer comprises first and second portions 20,22, where one bonding member is coupled to each of the portions. The portions 20,22 are electrically isolated, as they are only connected by way of the insulating carrier 32.

Regarding claims 16 and 34, the carrier transfers heat from the conductive layer down through to the bottom of the carrier.

Regarding claim 17, there is not disclosed a heat sink at the bottom of the carrier. However, heat sinks are well known in the art and are often used in laser systems containing a Peltier element such as in Kuribayashi. It would have been obvious to one skilled in the art to include such a heat sink in order to further dissipate heat from the laser, as is well known.

Regarding claim 18, Peltier element 14, which is a TEC device, is included.

Regarding claims 19-20, it is well known that a laser diode may comprise n and p sides. It would have been obvious to make the laser diode in this manner so that the laser diode can be efficiently and electrically pumped, as is well known. In such a laser, the top is typically one conductivity, while the bottom is the other. These can be switched depending on the manner in which current will be conducted through the laser, and such a switching will not significantly change the operation of the device and is deemed an obvious design choice. Depending on which of the p-type or n-type side is chosen for the top, claim 19 or 20 will be met.

Regarding claim 21, at least one of the bonding members carries an electrical signal.

Regarding claim 22, it is not disclosed that one of the wires may not carry an electrical signal. However, wires that are used purely for heat transfer are known in the art. It would have

Art Unit: 2828

been obvious to include on such wire with the other wires in order to dissipate heat from the laser diode and send it to the cooling system, as is well known.

Regarding claims 26 and 29, the wavelength of emission of the laser diode is not disclosed. However, 980 nm lasers are well known in the art, and it would have been obvious to one skilled in the art to use this specific type of laser diode as a matter of obvious engineering design choice depending on the intended application for the use of the laser.

Regarding claims 27-28, these claims merely detail the intended use of the device. The intended use of a device is not germane to the patentability of the device itself, and therefore these claims have not been given patentable weight.

Regarding claim 30, as the laser diode is mounted on the carrier, it is inherent that the carrier is structured and arranged for mounting a laser diode thereto.

Claims 1-3, 5, 10-13, 16-30, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson (previously cited US 6,072,815) in view of Roberts.

Regarding claim 1, 32-33, and 35, Peterson discloses in Fig. 1 a laser diode assembly comprising a carrier 18 having a top and bottom, the top having a thermally conductive layer 32 sized for attaching at least two bonding members thereto, a laser diode 12 having a top and bottom, the bottom being electrically coupled to the carrier 18 and the top inherently having at least one thermally conductive pad formed thereon and sized for attaching at least one bonding member thereto, and first and second bonding members (wires not numbered) thermally coupling the conductive pads to the conductive layer 32. While there is not an explicit disclosure of at least one conductive pad on the laser, it is inherent that this is the case because such pads are

Art Unit: 2828

necessary for attaching bonding wires. It is not explicitly disclosed that the layer 32 or the pads are thermally conductive, or that the bonding members thermally couple the layers to the pad. However, such elements are typically made of a metal material, and thus will necessarily be thermally conductive. It is not disclosed that there are two conductive pads on top of the laser diode. However, Roberts teaches that it is advantageous to include more than one bonding pad in a place where there are bonding pads (par. bridging col. 16-17). It would have been obvious to one skilled in the art to include these extra bonding pads in order to decrease the chance of catastrophic failure, as taught by Roberts.

Regarding claims 2-3, the carrier 18 is insulating and may be made of BeO or AlN.

Regarding claim 5, if there are a number of conductive pads, as deemed obvious above, then some will necessarily be formed on opposing sides of a top side of the laser diode 12.

Regarding claim 10, it is not disclosed that the laser diode has top and bottom electrodes. A laser diode will typically have top and bottom electrodes. It would have been obvious to make the laser diode in this manner so that it may be electrically pumped. As one of the electrodes will be on top, at least one of the conductive pads will be coupled to the top electrode.

Regarding claim 11, it is not explicitly disclosed that heat will be dissipated from the laser through the conductive pads. Since the bonding wires are made of conductive material, then heat will necessarily dissipate out from the laser through the wires.

Regarding claim 12, the bonding members are wires.

Regarding claim 13, there are numerous bonding members, therefore a third bonding member is included.

Art Unit: 2828

Regarding claims 16 and 34, the carrier transfers heat from the conductive layer down through to the bottom of the carrier.

Regarding claims 17-18, there is further a Peltier element 16 that acts as a TEC and a heat sink.

Regarding claims 19-20, it is not disclosed that the diode has n-type and p-type sides as claimed. It is well known that a laser diode may comprise n and p sides. It would have been obvious to make the laser diode in this manner so that the laser diode can be efficiently and electrically pumped, as is well known. In such a laser, the top is typically one conductivity, while the bottom is the other. These can be switched depending on the manner in which current will be conducted through the laser, and such a switching will not significantly change the operation of the device and is deemed an obvious design choice. Depending on which of the p-type or n-type side is chosen for the top, claim 19 or 20 will be met.

Regarding claim 21, at least one of the bonding members carries an electrical signal.

Regarding claim 22, it is not disclosed that one of the wires may not carry an electrical signal. However, wires that are used purely for heat transfer are known in the art. It would have been obvious to include on such wire with the other wires in order to dissipate heat from the laser diode and send it to the cooling system, as is well known.

Regarding claim 23, there are numerous bonding members, therefore it can be interpreted that more than one bonding member is included as the first bonding member.

Regarding claims 24-25, it is not disclosed that the number of first bonding members is either equivalent or not equivalent to the number of second bonding members. Peterson does not list the numbers of first and second bonding members, so there is no way of knowing if the

Art Unit: 2828

numbers are equivalent or not. However, the number of bonding members being equivalent or non-equivalent does not appear to be significant to the operation of the device. Thus, it would have been an obvious design choice to use either the same amount of wires or a different amount of wires for each.

Regarding claims 26 and 29, the wavelength of emission of the laser diode is not disclosed. However, 980 nm lasers are well known in the art, and it would have been obvious to one skilled in the art to use this specific type of laser diode as a matter of obvious engineering design choice depending on the intended application for the use of the laser.

Regarding claims 27-28, these claims merely detail the intended use of the device. The intended use of a device is not germane to the patentability of the device itself, and therefore these claims have not been given patentable weight.

Regarding claim 30, as the laser diode is mounted on the carrier, it is inherent that the carrier is structured and arranged for mounting a laser diode thereto.

Claims 6-9 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Kuribayashi and Roberts or Peterson and Roberts as applied to the respective claims above, and further in view of Kato et al. (previously cited US 6,349,104). Either Kuribayashi and Roberts or Peterson and Roberts teach the limitations of the claims shown above, but do not teach that the laser diode contains a ridge as claimed. Kato teaches in Fig. 2 a laser diode having a ridge, where the ridge is between bonding pads 12 at the top of the laser diode, and at least one of bonding members 12a, 12b does not pass over the ridge, depending on the placement of the laser diode and the portion it is bonded to. It would have been obvious to one skilled in the art to replace the

Art Unit: 2828

laser diode of Kuribayashi or Peterson with the laser diode of Kato because this laser diode has improved high power lasing characteristics, as taught by Kato.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. However, an argument against Kuribayashi is still relevant. Applicant argues that "claim 1 recites that the bottom of the laser diode is electrically coupled to the carrier...Kuribayashi does not teach or suggest an electrical connection on a side opposite the thermal connection." (p. 8 of response). Examiner disagrees. The laser diode is placed directly on the carrier, with the bottom end being disposed directly on the carrier. Such a direct contacting will necessarily yield an "electrical connection" so that the laser diode is electrically coupled to the carrier as required by the claim.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wickstrom et al. (US 6,368,890) also shows a laser diode having two conductive pads formed thereon.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (703) 605-4367. The examiner can normally be reached on M-F 8:30-5.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone numbers for the

Art Unit: 2828

organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JM
August 6, 2003


QUYEN LEUNG
PRIMARY EXAMINER
